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esting articles and notes on the flora of New England.

THE initial number of the *Bulletin* of the Cooper Ornithological Club of California contains a biographical sketch, with portrait of Dr. James C. Cooper, after whom the Club is named. Among the other contributions is one on the 'Nesting of the Fulvous Tree-Duck,' showing that this species frequently deposits its eggs in the nests of other species, and also that it is either more prolific than any other duck, or that several females lay in one nest, 28 to 32 eggs being found on several occasions.

THE publication of the *Osprey* for December, 1898, brings this magazine down to date, and we are promised that there will be no delays in the future. The leading article, by E. W. Nelson, is devoted to a 'Morning with the birds on Mount Orizaba,' and there is an interesting account of the Sea-birds off the New England coast by H. K. Job. A fine plate of blue jays, by Fuertes, closes the number, but this, like the other illustrations, has suffered in the printing.

THE *Bulletin* of the U. S. Fish Commission for 1897, Vol. XVII. of the series, is mainly occupied with the papers read at the National Fisheries Congress, held at Tampa, Fla., in January, 1898. Among the other papers are accounts of the Salmon Investigation of the Columbia River Basin in 1896, and of the Salmon Fishery of Penobscot River and Bay in 1895 and 1896.

THE February number of *The Open Court* contains an article by Professor R. M. Wenley, of the University of Michigan, on the Gifford Lectureships, established with an endowment of \$400,000, by the late Lord Gifford, in the four Scottish Universities, for the purpose of encouraging research in natural theology. In his will Lord Gifford stated that he wished the lecturers to treat their subject strictly as a natural science—as astronomy or chemistry is treated. The present incumbents of the lectureships are: At St. Andrews, the Hebrew scholar, Professor Wellhausen, of Marburg; at Glasgow, the physiologist, Professor Foster, of Cambridge; at Aberdeen and Edinburgh, Professors Royce and James, respectively, professors of philosophy and psychology at Harvard University.

SOCIETIES AND ACADEMIES.

WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS.

THE 29th annual meeting of the Academy was held on December 27th and 28th last, at Milwaukee, with the President, Professor C. Dwight Marsh, of Ripon College, in the chair.

Professor E. A. Birge, Director of the State Geological and Natural History Survey, made a report on the general progress of the Survey. Dr. E. R. Buckley followed with a special report on Wisconsin building stones and Professor D. P. Nicholson on lake investigations. Professor C. R. Van Hise and others urged that the recommendation of the Academy for the continuation and extension of the Survey be presented formally to the Legislature. A committee was appointed for this purpose.

It was voted as the sense of the meeting that the library of the Academy should be put in the custody of the State Historical Society when the latter should remove its own library to the new building provided for it by the State. The library of the Academy has become important, especially in the line of transactions of foreign societies, and it is expected that suitable rooms will be available for it in the new building.

Mr. Ernest Bruncken, Secretary of the State Forestry Commission, reported on the legislation which the Commission will endeavor to gain the present winter. Three lines of effort will be recommended: (1) to establish a complete corps of fire wardens and efficient supervision thereof; (2) to study conditions of forest growth, both in the forest itself and at experiment stations; (3) to educate public opinion.

The program of the meeting contained, together with other papers, the following of a scientific nature:

'Lake temperatures.' E. A. Birge.

'Contributions from the histological laboratory of the University of Wisconsin.' W. S. Miller.

'Further facts in relation to the succession-period of generations.' C. H. Chandler.

'Lantern Projections of Three Dimensional Curves and Surfaces,' and 'Theoretical Investigation on the Motion of Ground Waters—III, Mutual Interference of two or more Artesian Wells.' C. S. Slichter.

'The Maximum Gravitational Attraction at the Pole of a Spheroid.' E. F. Chandler.

'Combinations of Pythagorean Triangles as giving Exercises in Computation.' T. H. Saford.

'A Study of the Class of Electric and Magnetic Oscillations known as Aphotic.' J. E. Davies.

'Some Facts in Regard to the Development of Epischura.' C. Dwight Marsh.

'The Block System of Arranging Insect Collections.' Harriet B. Merrill.

'Spines of Trilobites and their Significance.' G. L. Collie.

'The Crystallography of a Gold Telluride from Cripple Creek,' and 'The Crystallography of a new Reduction Product of Terpene.' W. H. Hobbs.

'The Volume Relations of Original and Secondary Minerals in Rocks.' C. R. Van Hise.

'The Electrical Properties of Non-Aqueous Solutions.' A. T. Lincoln.

'The Effects of the Presence of pure Metals upon Plants.' Louis Kahlenberg and E. B. Copeland.

'Revision of the Pronouns, with Special Consideration of Relatives and Relative Clauses.' E. T. Owen.

The number of new members elected was 14. The active members of the Academy now number 200.

A. S. FLINT,
Secretary.

MADISON, WIS.

THE OHIO ACADEMY OF SCIENCE.

THE Ohio Academy of Science held its eighth annual meeting at Columbus, Ohio, on December 29 and 30, 1898, in Orton and Zoological Halls of the Ohio State University. Eighteen new members were elected. Hon. Emerson McMillen, a life member of the society, donated the sum of \$250 to be applied as the trustees of the Society may see fit, for the encouragement of investigation. Officers were elected for the coming year as follows: President, Professor G. Frederick Wright, of Oberlin; Vice-Presidents, Chas E. Albright, of Columbus, and A. D. Selby, of Wooster; Secretary, E. L. Mosely, of Sandusky; Treasurer, Professor Herbert Os-

born, of Columbus; Executive Committee, E. E. Masterman and G. H. Holferty; Publication Committee, F. M. Webster, of Wooster.

Professor W. G. Tight, of Dennison University, delivered the retiring President's address on the subject 'Geographical Teaching and the Geography of Ohio.'

The following papers were read: 'A Deep Pre-Glacial Channel in Western Ohio and Eastern Indiana,' by J. A. Bownocker; 'The Division of the Macrospore Nucleus of *Erythronium*,' 'Two Interesting Filamentous Bacteria from Columbus' and 'Nutation of the Cultivated Sunflower,' by John H. Schaffner; 'Some Recently Discovered Pre-Glacial Cols in Ohio,' 'A Galenite Geode from Muskingum Co.' and 'A Pocket Instrument for the Approximate Determination of Distance by Triangulation,' by W. G. Tight; 'Some Observations on *Unio subovatus*,' by F. L. Landacre; 'Some Observations on the Topography of Athens and Vicinity,' by H. E. Chapin and C. H. Stearns; 'The Laboratory and the Field—Their Relative Importance,' by H. E. Chapin; 'A Contribution to the Knowledge of the Faunistic Entomology of Ohio,' 'Some Notes on the Grape Cane Gall Maker, *Ampelogypter sesostris*,' and 'Some Apparent Relations of Ants to Peach aphid, *A. persicæ-niger*,' by F. M. Webster; 'Some Observations on the Pre-Glacial Drainage of Wayne and Associate Counties,' by J. H. Todd; 'A Plea for Science Teaching in the Public Schools,' by Miss Mary E. Law; 'Notes on Ecological Plant Geography of Summit, Wayne and Medina Counties' and 'Field Notes,' by A. D. Selby; 'Some Sources of the Ohio Flora,' by A. D. Selby and J. W. T. Duvel; 'Notes on Fasciation,' 'Some Abnormal Plant Specimens' and 'Further Studies in Embryology,' by Miss L. C. Riddle; 'Distribution of the Microscopic Fungi,' 'Reliability of Spore Measurements of the Fleishy Fungi,' 'The Illinois Biological Station' and 'Occurrence of Phalli near Cleveland,' by H. C. Beardsley; 'Climate of the Philippine Islands,' 'Life in the Philippines' and 'Some Rare Ohio Plants,' by E. L. Mosely; 'Development of the Microsporangium of *Hemerocallis fulva*,' by E. L. Fullmer; 'Lichens New to Ohio,' 'List of Phænogams New to Ohio or Rare in and New to Coun-

ties in Northern Ohio' and 'Lists of Erysipheæ and Uredineæ of Cuyahoga and other Counties of Northern Ohio,' by Edo Claassen; 'Studies of *Ustilago Reiliana*,' by W. A. and K. F. Kellerman; 'Plants New to the Ohio Flora' and 'Observations on the Ohio Flora,' by W. A. Kellerman; 'A Descriptive List of the Fishes of the Big Jelloway Creek System,' by J. B. Parker, E. B. Williamson and R. C. Osburn; 'Additional Notes on Franklin County Fishes,' by E. B. Williamson and R. C. Osburn; 'Additional Notes on the Crayfish of Ohio,' by E. B. Williamson; 'Additions to the Ohio List of Dragonflies,' 'Additions to the Ohio List of Butterflies' and 'Twenty-five Species of Syrphidæ not Previously Reported for Ohio,' by J. S. Hine; 'Remarks on the Hemipterous Fauna of Ohio, with a Preliminary Record of Species,' by Herbert Osborn; 'A Bat New to Ohio,' by J. F. Cunningham; 'A Female of the Purslain Sawfly, *Schizocerus* Sp?, with a Male Antenna,' by C. W. Mally; 'The Waste or Refuse in Fruit and Nuts,' by W. R. Lazenby; 'On the Occurrence of the Black-Capped Petrel, *Æstrelate hasitata*, at Cincinnati, Ohio,' by Joshua Lindahl.

R. C. OSBURN.

ENTOMOLOGICAL SOCIETY OF WASHINGTON.

January 12, 1899.—Under the head of exhibition of specimens Mr. Schwarz showed a true queen of an undescribed species of *Termes* which had been found by Mr. H. G. Hubbard in the Madera Cañon of the Santa Rita Mountains, Arizona. This is the first true Termite queen which has been found in North America.

Mr. Heidemann exhibited a species of the genus *Hoplinus* found by Mr. Schwarz in southern Arizona (Catalina Mountains). This is a curious species thickly covered with spines, on account of which Mr. Ashmead suggested that, as the vegetation of that region is spiny, the presence of this armatured bug indicated a case of protective resemblance. A long discussion ensued on the subject of mimicry and protective resemblance among insects, participated in by Messrs. Gill, Ashmead, Judd and Howard.

Dr. Dyar presented some notes on the phylogeny of the Lasiocampidæ. Apropos of Mr. Tutt's recent article on the subject he had gone

over the group and established a genealogical tree based principally upon the larval characters and the wing venation. The discussion of this paper took the form of a continuation of the subject of protective resemblance suggested by Dr. Dyar's remarks about the larvæ of this group of Lepidoptera, especially in relation to the sub-lateral structures developed as a means of eliminating the shadow cast by the caterpillars, consisting in one group of larvæ of a longitudinal white line and in others of lateral processes. Further discussion, by Messrs. Gill, Ashmead and Dyar, considered the larval characters of the Lepidoptera, Dr. Dyar stating that the most generalized larva is tuberculate, tubercles being lost and hairs being developed in the process of specialization.

Mr. Schwarz read a paper by Mr. H. G. Hubbard on the luminosity of a larviform Coleopter supposed to be the female of *Mastinocerus*, and supplemented Mr. Hubbard's note by general remarks on the females of Lampyrid beetles. Discussion followed, relating especially to the question as to whether luminosity in the Lampyridæ is a specialized condition, Dr. Gill taking the stand that from its more or less isolated occurrence in several groups of this family it is more likely to have been an original condition which has been lost perhaps by a majority of species in the process of specialization, calling attention to the analogy between this phenomenon in the Lampyridæ and Elateridæ to the phenomenon of electricity in the fishes, occurring as it does here and there in several groups. Mr. Schwarz stated that the relationship between the luminous Lampyridæ and the Elateridæ was closer than perhaps has hitherto been suspected and called attention to the fact that the larviform female of *Phengodes* was originally described by Le Conte as an Elaterid. Mr. Howard considered that from the fact that the species which lack this physiological quality correspond to the normal coleopterous type and that since the larviform females possess what may be termed highly degradational characteristics comparable to those acquired by a life of parasitism, for example, the luminosity should probably be considered a high specialization of comparatively recent origin.

The final paper of the evening was presented

by Mr. Howard who exhibited a series of Australian insects of economic importance and made a brief statement of the present condition of economic entomology in the Australian colonies. He called attention to the fact that the introduction of agriculture on a large scale in this comparatively new region had resulted in the attacks of many native species upon cultivated crops. The specimens shown had been sent him by Mr. W. W. Froggatt, the Entomologist of the Department of Agriculture of Sydney, New South Wales, and included a number of species of great economic importance. He noted the curious habit of the apple root-borer (*Leptops hopei*) in laying its eggs in the folded leaf of the apple, the newly hatched larvæ dropping to the ground and entering the roots; the damage done by the orange bug (*Oncosalis sulciventris*), the vine moth (*Agarista glycina*) and a number of other species, showing among other things that the so-called climbing cut-worm named by Mr. Froggatt *Plusia vertiserrata* is apparently nothing but our North American *Prodenia lineatella*. In briefly discussing this paper Mr. Schwarz drew a comparison between the large number of native species which, by a change of habit, have attacked cultivated crops in Australia and the extremely small number which have similarly changed their habits in our own Northwest. He recalled no native species in Washington and Oregon which have become crop pests.

L. O. HOWARD,
Secretary.

THE ACADEMY OF NATURAL SCIENCES OF
PHILADELPHIA.

December 20, 1898. PROFESSOR ANGELO HEILPRIN made a communication on the physical geography and geology of the Klondike region, with incidents of a summer trip to Dawson City. The general features of the country traversed were described and profusely illustrated by lantern views.

A paper entitled 'Synopsis of the United States species of the Hymenopterous genus *Centris* Fabricius,' by William J. Fox, was presented for publication.

January 10, 1899. PROFESSOR H. A. PILSBRY described a New Mexican Helicoid land shell

received from Professor Cockerell. A dissection showed that the form agreed with the Epi-phragmophora in the structure of the generative organs and the form of the kidney, while the shell closely resembles *Polygyra*. The new genus thus defined was named *Ashmunella* in recognition of the services of the collector.

DR. WILLIAM H. DALL referred to the discussion at the recent meeting of the Geological Society of America of the authenticity of the Calveras skull, and described the specimen as examined by him immediately after it came into the possession of Professor Whitney, of the Geological Survey of California. The speaker believed that so far no sufficient reason had been adduced for doubting the genuine character of the skull and its original situs below the lava, though the question of the coexistence of man and the extinct mammals whose remains have been found in the same gravels is entirely distinct and may reasonably be left open.

The subject was discussed by Mr. Lewis Woolman, who also referred to recent ineffectual attempts to find implements of human manufacture in the Trenton gravels.

A paper entitled 'New and Interesting Species in the Isaac Lea Collection of Eocene Mollusca,' by Charles W. Johnson, was presented for publication.

January 17, 1899. MR. CHARLES S. BOYER read a paper on the general study of diatoms and on the characters of the forms found in the neighborhood of the mouth of Pensauken creek and elsewhere near Philadelphia.

MR. LOUIS WOOLMAN dwelt on the geological position and characters of the deposits containing the forms enumerated by Mr. Boyer and exhibited microscopic preparations in illustration of his remarks.

PROFESSOR ANGELO HEILPRIN, alluding to Dr. Dall's communication on the Calaveras skull, recounted the arguments for and against its authenticity recently presented to the Geological Society of America. Heregarded the present evidence of the miners as worthless. He had calculated the age of the cañon to be quite consistent with the existence of Indians contemporaneous with the deposit of the skull, although he agrees with Dr. Dall that, with the

evidence now in our possession, the question could not be definitely settled.

MR. P. P. CALVERT referred to a recently published paper on the structure of the gizzard of dragon flies and recounted the results of the recorded observations. He had been able to dissect out the gizzard, in good condition for study, from dried specimens, one having been obtained from a fly captured in Burmah in 1889. The ridges, which form a prominent feature of the organ, do not seem to be smoothed away by food, their function being probably that of a sieve.

EDW. J. NOLAN,
Recording Secretary.

ZOOLOGICAL CLUB, UNIVERSITY OF CHICAGO.
MEETINGS OF THE AUTUMN QUARTER.

Polymorphic Nuclei in Embryonic Germ-cells.—While studying the oogenesis of *Loligo pealei* Les., the squid common at Woods Holl, Mass., I noticed that the embryonic germ-cells showed nuclei much lobed and contorted—a condition which has been observed in other germ-cells and variously accounted for as due to amitosis; to deterioration with accompanying fragmentation, to increase of the assimilating surface, etc. I wish here briefly to call attention to this condition in the squid. An account of the oogenesis will soon be completed.

Sex first becomes distinct shortly after hatching, the embryonic germ-cells being apparently indifferent. During and for a short time after the embryonic period the genital gland rests upon the left tongue of the internal yolk-lobe. Nourishment is evidently direct through the yolk-epithelium, the genital blood-vessels developing toward the end of this period. During this time the nuclei of the germ-cells enlarge rapidly and show marked lobes, bays and contortions, a centrosome occurring in one bay of each nucleus. Their descendants, the oo- and spermatogonia, also show a polymorphism of the nuclei which becomes less striking as the number of generations increases and the size of the cells decreases. These cells always lie near the blood-vessels of the gland, and their chromatin, like that of the parent cells, is never finely divided, but massed in clumps, a large clump lying near each bay of the nucleus. A similar

though less marked polymorphism exists in nearly all the somatic nuclei at this embryonic period, and is conspicuous in those rapidly proliferating stroma-cells at the hilum in which the blood-vessels form.

This condition of the nuclei in the germ-cells of the squid is due neither to deterioration nor to amitosis, for it is shown by all the germ-cells, which after attaining a large size divide by mitosis, giving rise to the oo- or spermatogonia. It seems probable that it is here caused by the rapid growth of the nucleus, together with the retention of the centrosome and massed condition of the chromatin in these rapidly dividing embryonic cells.

MARY M. STURGES.

Larvæ of Arenicola cristata.—The highly resistant organization of these larvæ renders them remarkably well fitted for artificial rearing. They may be reared from the egg in sea water kept aerated by *Ulva* up to a stage where the structure and habits of the adult are practically complete. Addition of carmine powder to the sea water seems to accelerate development up to a certain point, probably on account of the increased food supply which is thus furnished to the developing larvæ.

They leave the egg-strings as slightly elongated, strongly heliotropic larvæ with two eyespots and three body segments, each with two pairs of setæ. Prototroch and paratroch, together with a median ventral band of cilia, are present, and by their aid the larvæ swim about, actively rotating on the long axis at the same time. After a day or two they settle down and begin to form the tubes in the interior of which they undergo the remainder of their development. These tubes are of very simple construction, being composed of any convenient foreign particles united by a glutinous substance secreted apparently by certain large clear cells, situated anteriorly, which are to be regarded as gland-cells. From now on development progresses uniformly and growth proceeds as usual by the addition of segments at the posterior end. The opacity resulting from the presence of the yolk gradually diminishes as the yolk becomes absorbed, and when twelve segments

or so are present the larvæ have become almost perfectly transparent. By this time the mouth and anus have appeared and the three divisions of the intestine are established, the mid-gut, or stomach, which is very early distinguishable, being sharply marked off from the fore- and hind-guts, the latter of which is ciliated. The anterior part of the fore-gut is eversible and forms a proboscis, which appears at an early stage, and by its activity the neighboring particles of débris are taken into the intestine, and as they pass through the latter the food material is extracted, just as in the adult.

The essential habits of the adult are thus assumed at a very early stage. As the larva grows older the uniform segmentation of the body undergoes an alteration, and by the time thirty segments or so are attained there is perceptible a division of the body into two quite distinct regions, which correspond to a similar division in the adult, where the anterior part of the body, including the first eighteen segments, is of considerably greater diameter than the remaining posterior part, which consists of a large and inconstant number of very short segments of similar structure. This division gradually becomes more definitely established, and at the same time the gills make their appearance a simple thin-walled outgrowth of the body-wall, which gradually become branched in a more and more complex manner. There are thus formed eleven pairs of these structures, situated in segments 8 to 18 inclusive and containing looped blood-vessels derived from the main vascular trunks. The nephridea are already visible through the transparent body-wall, as six pairs of somewhat elongated sac-like structures situated in segments 5 to 10. The otocysts are now clearly visible; the circulation of the blood, with the contractions of the dorsal vessel and of the two 'hearts,' can be readily seen, as can also the secondary external division of each of the anterior segments into five by superficial circular grooves. At this stage, in fact, apart from this small size (12 to 18 mm.), and complete transparency, the larvæ are in both habits and structure practically identical with the adult.

R. S. LILLIE.

The following papers were also presented during the quarter: 'Caspar Friedrich Wolff

and the Theoria Generationis,' Dr. W. M. Wheeler; 'Field Work at Turkey Lake and a Series of Turtle Embryos from that Locality,' Miss E. R. Gregory; 'Recent Literature on Spermatogenesis,' M. F. Guyer; 'Eisig on the Development of the Capitellids,' Dr. C. M. Child; 'Early History of the Optic Vesicles and Accessory, Eye-like Vesicles in Vertebrates,' Dr. W. A. Locy, of Northwestern University; 'Characteristic Features of Mitosis and Amitosis,' Dr. S. Watasé; 'The Field Columbian Museum Expedition to Africa in 1896,' Dr. D. G. Elliott, Director of the Expedition; 'Protective Coloration,' Dr. W. H. Dudley.

DISCUSSION AND CORRESPONDENCE.

THE STORING OF PAMPHLETS.

A CHEAPER grade of pamphlet box than those described by Dr. Minot can be obtained, made of pasteboard instead of light wood. They are strong enough for ordinary service. Those which I use were obtained at a local bindery, not made to order, but kept in stock, and measures 11 x 7 x 3 inches. They are open at the back; the front face, 11 x 3, is covered with black cloth, to which a label is easily attached.

For pamphlets of quarto size, too large to get in these boxes, and not taking kindly to a vertical position, I have procured covers with pasteboard sides and a partly flexible back. The two sides measure each 12 x 10 inches, and the back, attached to 12-inch edges, is 3 inches wide. The outside is of black cloth, two thicknesses of which make the flexible part of the back. A strip of pasteboard one-inch wide gives stiffness to the middle of the back and a place for the label. When first put into service a sufficient number of pamphlets must be put in each cover to fill one inch in depth. The flexible part of the back, one inch on either side of the pasteboard strip, will allow an expansion of two inches before the contents require reassorting. The covers may be placed one upon another on the shelves, arranged in groups of subjects. These I find very serviceable for the larger pamphlets.

WINSLOW UPTON.

BROWN UNIVERSITY,

January 28, 1899.